INSTRUCTION MANUAL FOR THE DOUBLE STUB TUNER

Weinschel Engineering

KENSINGTON, MARYLAND

MODELS DS-109, 109L & 109LL
DOUBLE STUB TUNERS

WE CO ®

USES:

The Double Stub Tuner is used as a variable radio frequency impedance transformer and as such can be used to match between a wide range of impedances. The most common use is to transform a load impedance to the impedance of a transmission line feeding the load so as to achieve a maximum transfer of power and to maintain a low standing wave ratio on the line. This becomes particularly important when making power or attenuation measurements since the assumption is usually made that the incident power is being measured and this is only correct if the power measuring element absorbs all power incident on it.

DESCRIPTION:

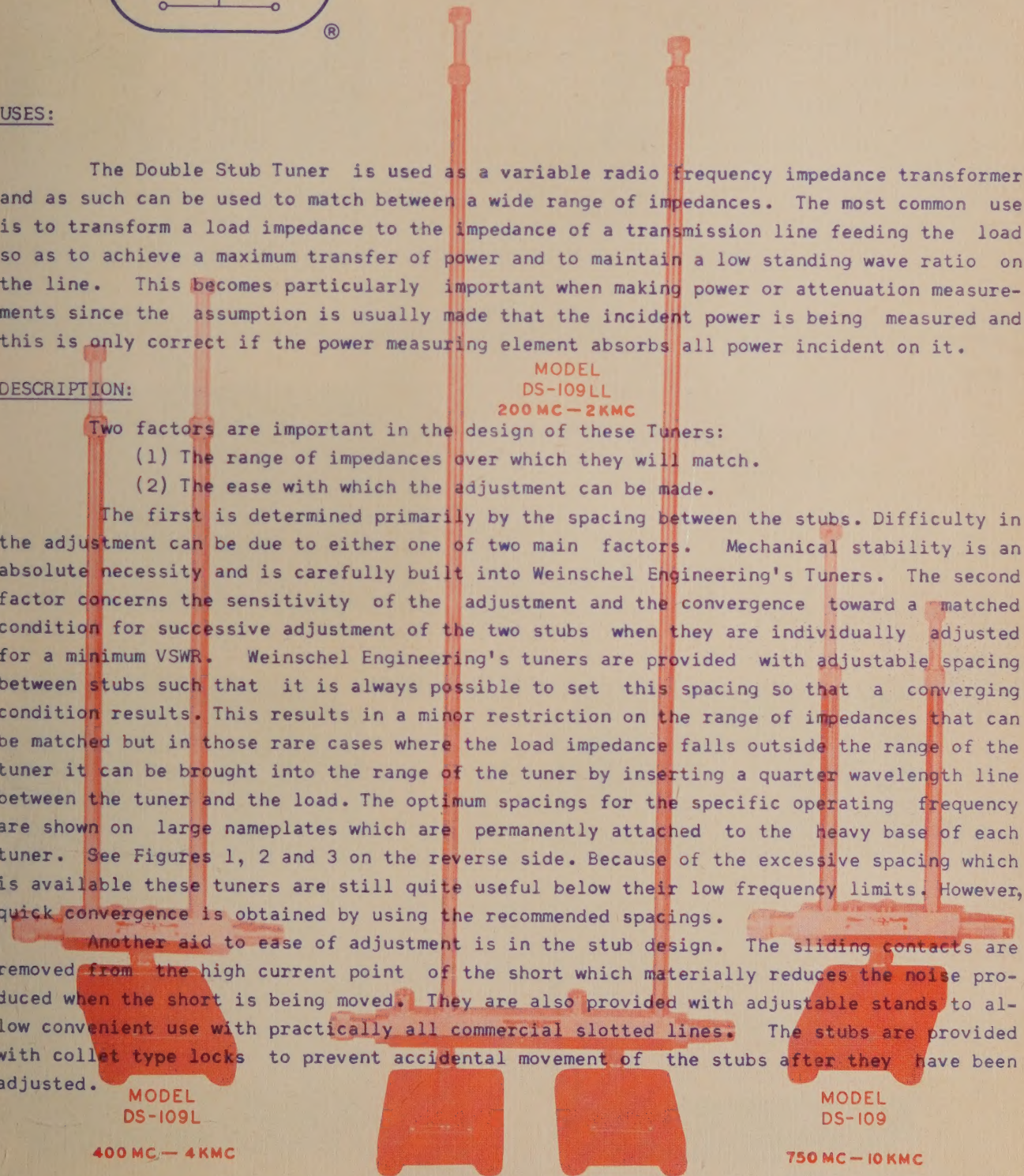
Two factors are important in the design of these Tuners:

(1) The range of impedances over which they will match.

(2) The ease with which the adjustment can be made.

The first is determined primarily by the spacing between the stubs. Difficulty in the adjustment can be due to either one of two main factors. Mechanical stability is an absolute necessity and is carefully built into Weinschel Engineering's Tuners. The second factor concerns the sensitivity of the adjustment and the convergence toward a matched condition for successive adjustment of the two stubs when they are individually adjusted for a minimum VSWR. Weinschel Engineering's tuners are provided with adjustable spacing between stubs such that it is always possible to set this spacing so that a converging condition results. This results in a minor restriction on the range of impedances that can be matched but in those rare cases where the load impedance falls outside the range of the tuner it can be brought into the range of the tuner by inserting a quarter wavelength line between the tuner and the load. The optimum spacings for the specific operating frequency are shown on large nameplates which are permanently attached to the heavy base of each tuner. See Figures 1, 2 and 3 on the reverse side. Because of the excessive spacing which is available these tuners are still quite useful below their low frequency limits. However, quick convergence is obtained by using the recommended spacings.

Another aid to ease of adjustment is in the stub design. The sliding contacts are removed from the high current point of the short which materially reduces the noise produced when the short is being moved. They are also provided with adjustable stands to allow convenient use with practically all commercial slotted lines. The stubs are provided with collet type locks to prevent accidental movement of the stubs after they have been adjusted.



MODEL DS-109LL
200 MC — 2 KMC

MODEL DS-109L
400 MC — 4 KMC

MODEL DS-109
750 MC — 10 KMC

Prices and specifications are subject to change without notice. Terms are 1%-10 days, net-30 days, subject to approval of credit. Prices include commercial inspection and packing for domestic shipment to Continental U.S.

MANUFACTURERS OF
COAXIAL
ATTENUATION
STANDARDS

Weinschel Engineering

10503 METROPOLITAN AVENUE, KENSINGTON, MD. Lockwood 4-0122
BULLETIN NO. 19 APRIL, 1957

SPECIFICATIONS

Model No.	DS-109	DS-109L	DS-109LL
Frequency Range, MCS	750 - 10,000	400 - 4,000	200 - 2,000
Impedance Match	See Note (1)		
Line Impedance	50 Ohms		
Length of Stub Travel, CM	20.5	38	76
Overall Length, In.	6-1/8	6-1/8	12
Overall Height, In.	12½ to 20-3/4	20½ - 35-3/4	36¼ - 66½
Connectors	One Male, One Female Type N		
Height of Center Conductor, In.	2-3/8 - 3-1/4		
Weight	5#	6#	12#
Price	$150.00	$165.00	$190.00

Note (1):

Any impedance greater than 50 Ohms resulting in a VSWR of less than 7.0 can be matched to a 50 Ohm line; any impedance less than 50 Ohms can be matched to a 50 Ohm line within the specified frequency range. The tuners can be used at lower frequencies as specified but the range of matchable impedances will be more restricted.

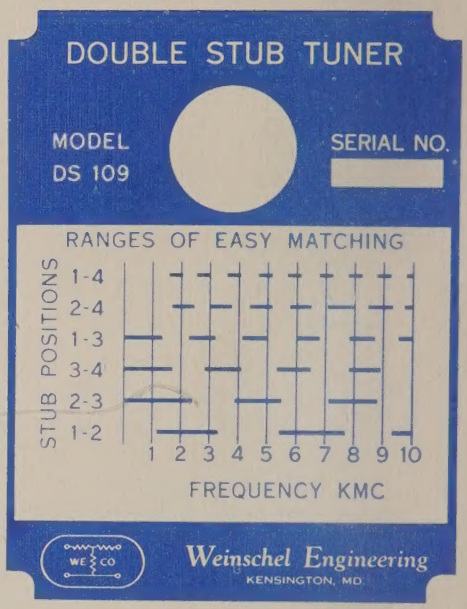


FIGURE 1

Model DS-109 Nameplate

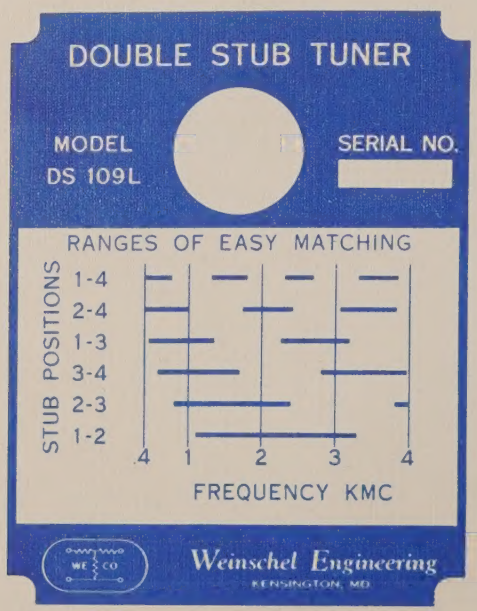


FIGURE 2

Model DS-109L Nameplate

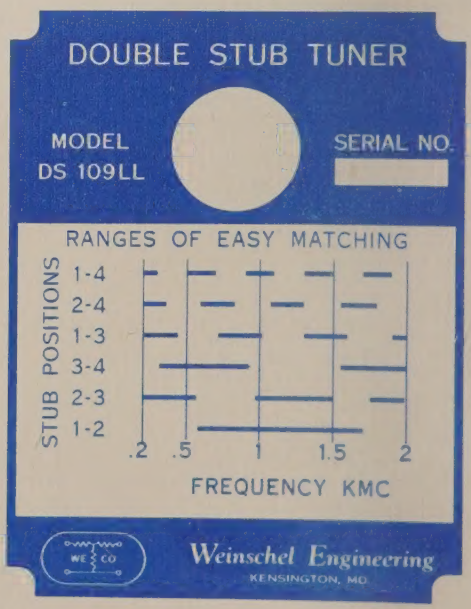
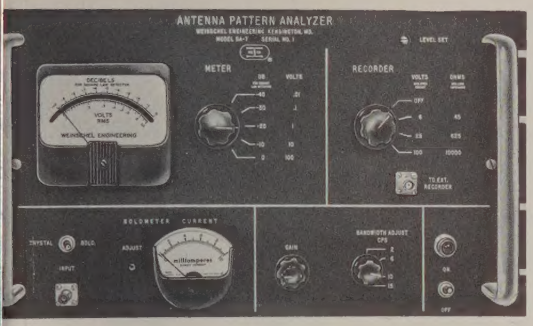


FIGURE 3

Model DS-109LL Nameplate

SHORT FORM CATALOG



Antenna Pattern Analyzer—Model BA-7

Maximum range of measurement in one step is 45 db (r.f.) using a maximum of 1 microwatt r.f. power.

The BA-7 is the heart of a video detector system designed primarily for r.f. crystals. For greater versatility, a d.c. biasing circuit is included to permit use of conventional barretters, requiring a d.c. bias between 0 and 10 ma. The unit can be used to measure very high power ratios such as occur in making antenna pattern measurements, to determine the rejection coefficients of r.f. filters, and to calibrate attenuators. It has a wide dynamic linear range, a low noise level and a wide r.f. frequency range where video crystal mounts are available.

For complete specifications, write for Bulletin No. 141.

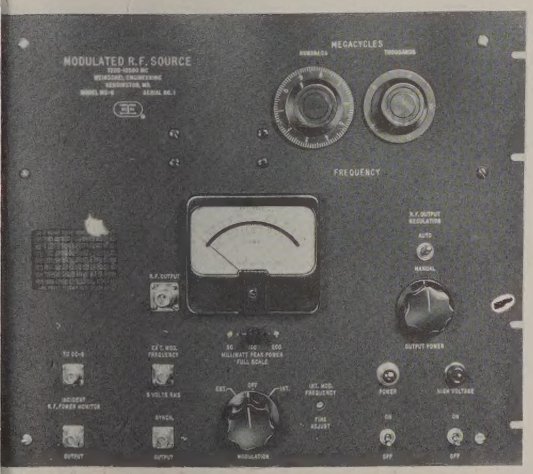
Square Wave Modulator—Model MO-1A

0.01% Frequency Stability (1000 CPS)

Used to 100% square wave modulate r.f. signal sources including klystrons. It is used where high stability is required for the audio frequency modulation of the r.f. signal.

This instrument features excellent amplitude and frequency stability, sine wave output, square wave output, external synchronization and adjustable internal oscillator.

For complete specifications, write for Bulletin No. 47.



odel MS-6

100% Square Wave Modulated RF Sources

50 to 10,500 MCS—Models MS-1 to MS-6
High Amplitude and Frequency Stability

Output Amplitude Independent of Load—Using external directional coupler, feedback circuit maintains constant incident power, allowing use of full generator output without power consuming impedance masking.

Amplitude Stability—After one hour warm-up, and without feedback circuit: ±0.1 db/hr. With regulator and external directional coupler, the incident power will change less than .02 db/hr. for a constant load and less than 0.2 db for a change in load impedance from 25 to 150 ohms.

Model No.	Frequency MCS	Minimum Peak Power Output (100% square wave modulated)
MS-1	50-250	80 MW
MS-2	250-920	200 MW
MS-3	900-2000	100 MW
MS-4	2000-4200	2000-2300 MCS: 20 MW 2300-3900 MCS: 60 MW 3900-4200 MCS: 20 MW
MS-5	4000-7300	4000 to 6500 MCS: 50 MW 6500 to 7300 MCS: 20 MW
MS-6	7200-10,500	7200 to 7400 MCS: 20 MW 7400 to 9000 MCS: 30 MW 9000 to 10,500 MCS: 20 MW

For complete specifications, write for Bulletin No. 190.

WE CO

Weinschel Engineering

10503 METROPOLITAN AVENUE • KENSINGTON, MARYLAND
LOckwood 4-0121 TWX KENSINGTON, MARYLAND—446

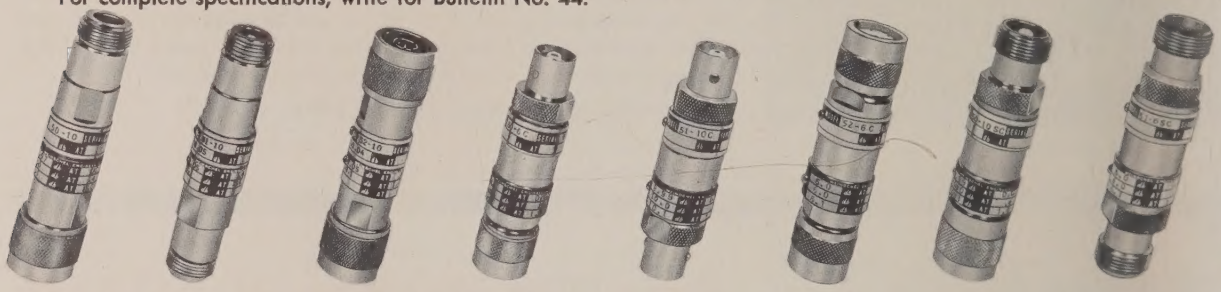
FIXED COAXIAL ATTENUATORS—D.C. TO 12.4 K

Our experience in making coaxial attenuators with our own stable film resistors since 194 is your assurance of quality and long term repeatability.

Model 50 *D.C. to 1 KMC, Usable to 2 KMC*

50 Ohm • Attenuation: 1 to 50 db • Maximum Input VSWR: 1.15, Bilateral • Calibration and Test Data Supplied: Inser loss at d.c., 400 and 1000 mc in 50 ohm system. VSWR for both connectors at 400 and 1000 mc when terminated in ohms • Stability: Excellent shock and vibration resistance. Negligible change of attenuation under humidity and temp ture cycling. Stable under pulse power. • Connectors: Type N, C or SC. Each type is available with male/female, do male or double female connectors. • Finish: Models 50, 51, 52 (Type N connectors), stainless steel; Models 50C, 51C, (Type C connectors) and 50SC, 51SC, 52SC (Type SC connectors), nickel plated.

For complete specifications, write for Bulletin No. 44.



N Connectors 1 Male, 1 Female | N Connectors 2 Female | N Connectors 2 Male | C Connectors 1 Male, 1 Female | C Connectors 2 Female | C Connectors 2 Male | SC Connectors 1 Male, 1 Female | SC Connectors 2 Female | SC 2 M

Model 10

10 Watt Power Pads

Frequency Range: D.C. to 1 KMC

50 Ohm

Attenuation 1 to 20 db

Connectors:

Type N, 1 male, 1 female Bilateral

Maximum Input VSWR: 1.15

Power Sensitivity: Less than .1 db/10 watts

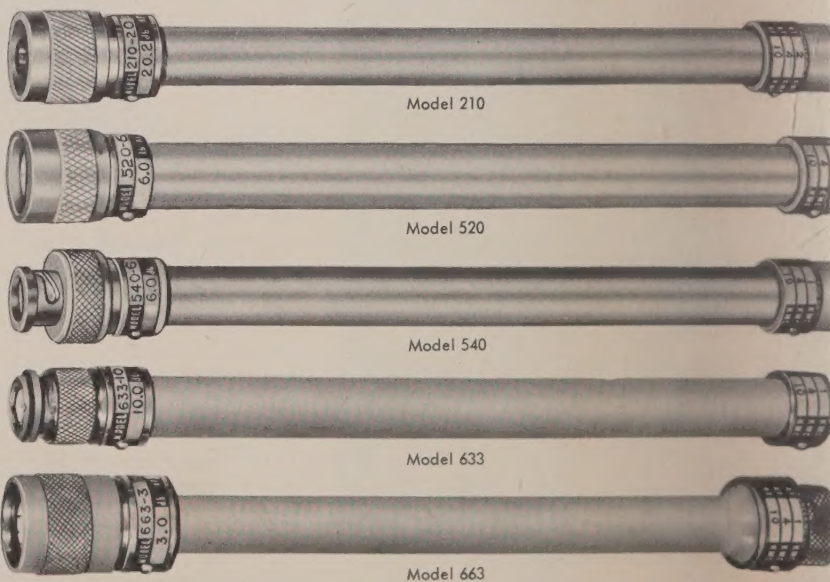
Calibration Frequencies: D.C., 400 mc, 750 mc, 1000 mc

Finish: Stainless steel connectors; black anodized aluminum body

For complete specifications, write for Bulletin No. 27.

Models 210, 520, 540, 633 and 663 *1 to 12.4 KMC*

50 Ohm • Attenuation: 1 to 20 db • Connectors: Type N, C, BNC, TNC or SC. E available with male/female, double male or double female connectors. • Calib Data Supplied: Insertion loss in 50 ohm system at 1, 4 and 10 KMC to nearest 0.1 KMC instead of 1 KMC for 20 db attenuator) • Stability: Excellent shock and vib resistance. • Negligible change of attenuation under humidity and temperature c or pulse power. • Finish: Models 210, 211, 212 (Type N connectors), stainless steel; models (Type C, BNC, TNC and SC connectors), nickel plated.



Model 210

Model 520

Model 540

Model 633

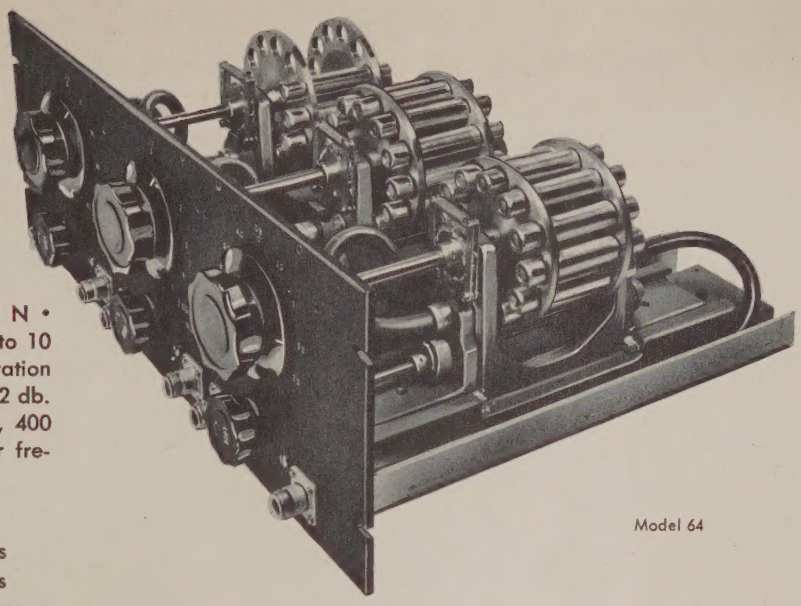
Model 663

ORDER BY MODEL NUMBER

Connectors	Type N	Type C	Type BNC	Type TNC	Type
1 Male 1 Female	210	520	540	633	663
2 Female	211	521	541	634	664
2 Male	212	522	542	635	665

For complete specifications, write for Bulletin No. 17.

ep Attenuators—
odels 60, 64, 640—
r Use in Standards Labs



Model 64

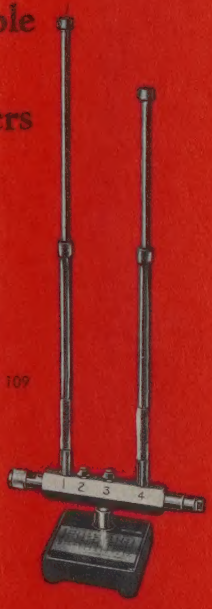
D.C. to 1 KMC

Impedance: 50 Ohm • Connectors: Type N • Accuracy (at D.C.): 1 to 5 db: .02 db; 6 to 10 db: .05 db; 20 to 50 db: .10 db • RF Calibration Accuracy: 1 to 30 db: .1 db; 40 to 50 db: .2 db. We supply individual calibration at D.C., 400 and 1000 mc and upon request at other frequencies.

Attenuation Range:

Model 60: 2 drums, 0-60 db in 1 db steps
Model 64: 3 drums, 0-64 db in .1 db steps
Model 640: 3 drums, 0-110 db in 1 db steps

For complete specifications, write for Bulletin No. 37.



uble
b
ners

DS 109

on base for easy
ing
-type locks prevent
dental movement of

stable spacing be-
stubs
table height of con-
rs

uency Ranges

109 .75 to 10 KMC
109L .4 to 4 KMC
109LL .2 to 2 KMC

complete specifica-
write for Bulletin No.

535-MN 535-MC 535-MSC 535-MB 535-MT

535-FN 535-FC 535-FSC 535-FB 535-FT

Coaxial Terminations—Model 535

D.C. to 10 KMC; 50 Ohm

Connectors: N, C, SC, BNC, TNC

Individual VSWR Calibrations Supplied at Seven Frequencies: d.c., .4, 1, 2, 4, 7.5 and 10 KMC. Other frequencies upon request.

Made with Weinschel film resistors for maximum stability; rated 1watt average, 1 KW peak power.

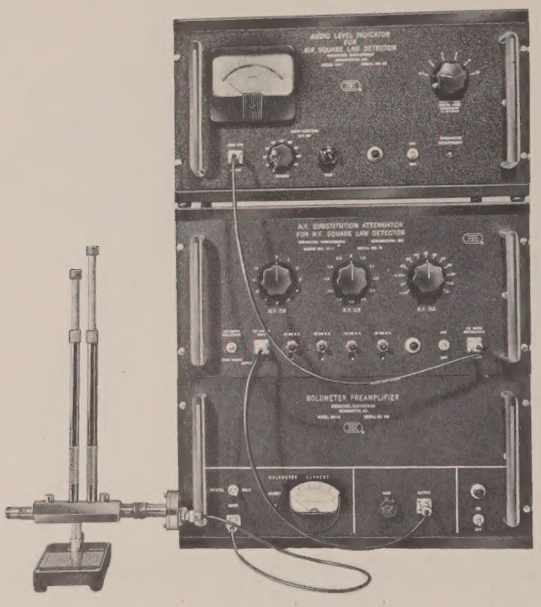
Maximum VSWR of Model 535 with Male or Female Type N Connector:

D.C. to 1 KMC: 1.03
1 to 4 KMC: 1.05
4 to 10 KMC: 1.15

For complete specifications, write for Bulletin No. 46.

WE CO ® *Weinschel Engineering*

INSERTION LOSS MEASURING EQUIPMENT



Single Channel Insertion Loss Test Set

Measure attenuation directly up to 30 db
Typical systems error: .1 db
Resolution: about .02 db
Frequency Range: 20 mcs to 90,000 mcs

KEY INSTRUMENTS

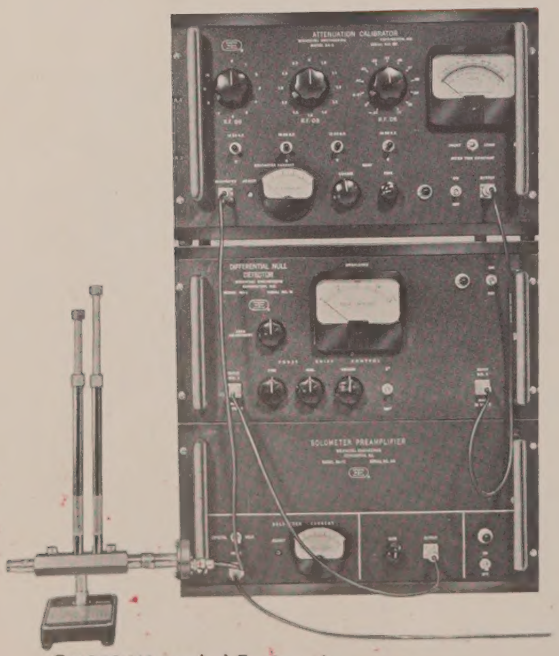
Bolometer Preamplifier, Model BA-1C:
Features wide dynamic linear range, extremely low noise level, c
not burn out barretter.

AF Substitution Attenuator for RF Square Law Detector, Mod
CF-1:
Calibrated directly in r.f. power ratios; has high input impedan
low output impedance.

Audio Level Indicator, Model IN-1:
Precharging circuit reduces required observation time. Has adjusta
indicator time constant, low noise level.

For theory, method, required instruments and recommended acc
sories, write for Weinschel Engineering Application Note No. 1.

Dual Channel Insertion Loss Test Set—For Standards Lab



.01 db precision for 20 db measurement
With changes of .1 db in level of r.f. source
Typical Systems Accuracy: .02 db/10 db
Attenuation Range: 20 db, direct; 40 db with partial r.f. substitut
Frequency Range: 20 mcs to 90,000 mcs

KEY INSTRUMENTS

Attenuation Calibrator, Model BA-5:
Combines precise Audio Substitution Attenuator, Bolometer Prec
plifier and Level Indicator.

Differential Null Detector, Model ND-1:
Specifically designed for two channel loss measurements.

Bolometer Preamplifier, Model BA-1C:
Features wide, dynamic linear range, extremely low noise level, c
not burn out barretter.

For theory, method, required instruments and recommended acc
sories, write for Weinschel Engineering Application Note No. 4.

© 1959 Weinschel Engineering

PRINTED IN U.S.A.

WE CO ®

Weinschel Engineering

10503 METROPOLITAN AVENUE • KENSINGTON, MARYLA
LOckwood 4-0121 TWX KENSINGTON, MARYLAND—

www.manualsplus.com
1030691